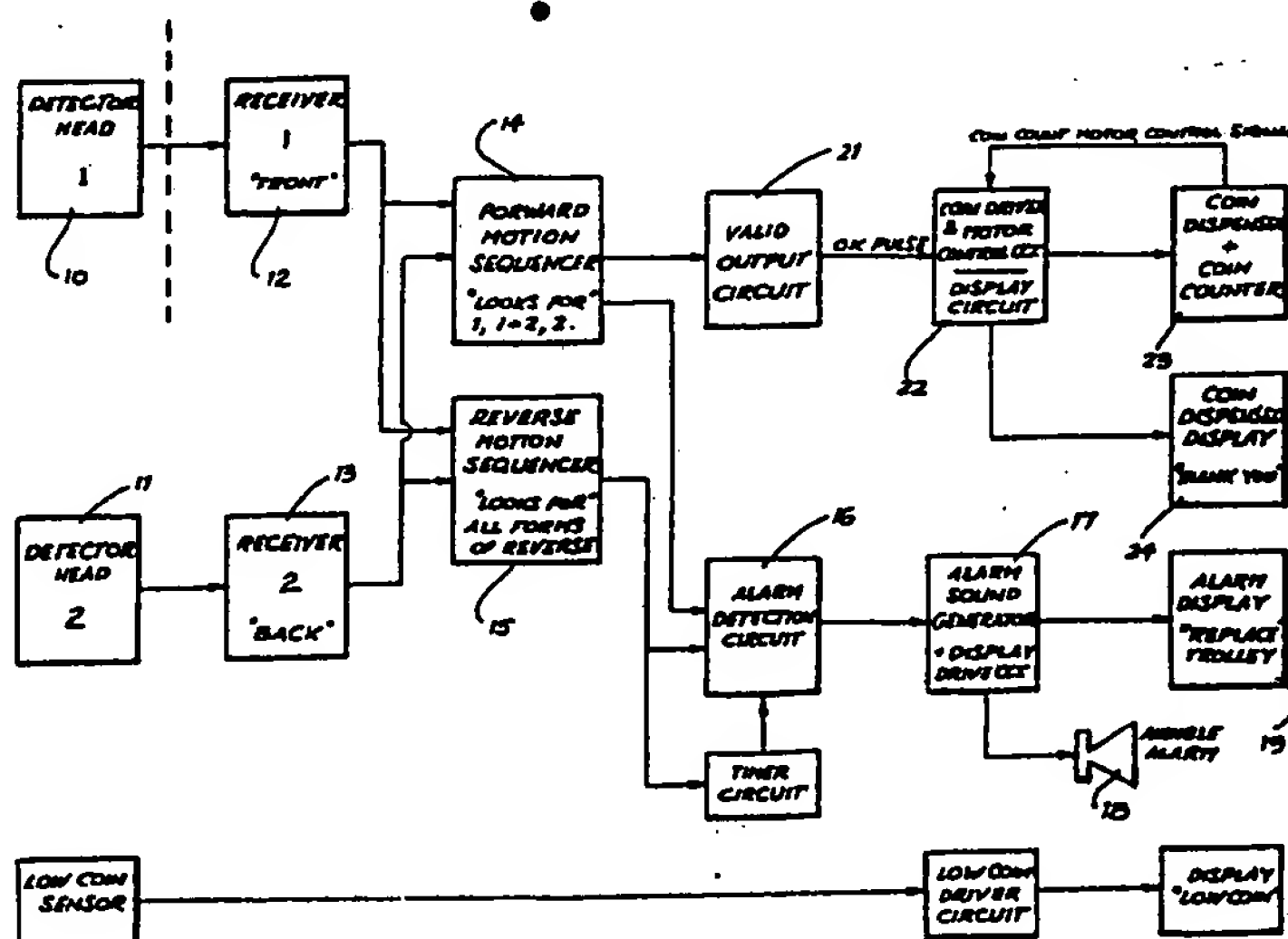




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: RECEIVING AND ACKNOWLEDGING THE RETURN OF A TROLLEY AT A CHECK-IN POINT



## (57) Abstract

Apparatus for responding to returned trolleys in a retail establishment comprising a detector (10, 11) positioned to monitor the movement of a trolley through an opening to a trolley reception area, a direction-sensitive device (14, 15) responsive to the direction of the trolley's movement through the opening, a dispenser (23) controlled by the detector (10, 11) to dispense an item of monetary value to a shopper who correctly returns a trolley through the opening and means (15, 16, 17, 18) controlled by the direction-sensitive device (14) to discourage the removal of a trolley from the trolley reception area by way of the opening. Preferably, the detector has two metal-detecting members (10, 11) and an item is dispensed only when a predetermined sequence (14) is detected. The means (15-18) is preferably an audible alarm or a movable barrier. A trolley identification unit may be incorporated.

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RECEIVING AND ACKNOWLEDGING THE RETURN OF A TROLLEY AT A  
CHECK-IN POINT

THIS INVENTION relates to the control of trolleys and is more specifically concerned with reducing the loss of shopping trolleys from retailing premises such as supermarkets and department stores.

It is common practice for the larger retailers to provide shopping trolleys for the convenience of their customers. A larger quantity of goods can then be purchased and comfortably conveyed to the shopper's car, parked adjacent to the store. The goods are then transferred to the car and the trolley either placed on one side or returned to the store by the shopper or staff employed by the store for that purpose.

Unfortunately the shopper who returns his trolley to the store tends to be the exception rather than the rule and the loss of available trolleys to shoppers entering the premises during peak shopping times can discourage potential shoppers. Also the accumulation of empty trolleys in the carpark where children often play with them poses a risk of injury and damage to vehicles. Because of these problems, local by-laws are being increasingly used to make the retailing premises responsible for the nuisance caused by their trolleys being left in public places or any damage or injury which results. Further, trolleys represent a substantial capital item and the proprietors of such stores seek to minimise their loss.

An object of this invention is to provide apparatus usable in retailing premises to encourage shoppers to return trolleys, and which does not require additional staff to be employed for this purpose.

In accordance with one aspect of the invention, apparatus for responding to returned trolleys in a retailing establishment comprises a detector positioned to monitor the movement of a trolley through an opening leading to a



trolley-reception area, a direction-sensitive device responsive to the direction of the trolley's movement through the opening, a dispenser controlled by the detector to dispense an item of monetary value, such as a coin token or ticket to the shopper who correctly returns a trolley through the opening, and means controlled by the direction-sensitive device to discourage the removal of a trolley from the trolley reception area by way of the opening.

Preferably the apparatus includes a trolley-identification unit which responds to an inherent characteristic of the trolley to provide an electrical output which exercises a supervisory control over the dispenser to prevent release of the item unless said inherent characteristic has been recognised by the unit.

When a shopper passes through a check-out of the store, a sum of money, for example twenty cents, is added to the bill. The amount is refundable on return of the trolley. Alternatively the shopper will receive a token or ticket redeemable for that amount. After unloading the trolley in the carpark it is brought back to the trolley-reception area which may be in the store and pushed through the opening which will normally be at the end of an aisle or corridor slightly wider than the width of the trolley and provided with guides to constrain its movement to a pre-determined path. The action of pushing the trolley through the opening in the correct direction triggers the dispenser to refund, for example, twenty cents, or dispense a token, ticket, or other item of monetary value.

The detector may be arranged to respond to one or both sides of the trolley and may be split into two or more operative divisions spaced along the direction of movement of the trolley through the opening. This reduces the risk of an incorrect sensing of a trolley caused perhaps by a foreign object being passed in front of the detector in the



hope of operating the dispenser. The detector conveniently includes a pair of detecting members which respond in a predetermined order signifying the movement of the trolley is in the correct direction. Only then will the coin, ticket or token be dispensed to the shopper.

Means for discouraging the shopper withdrawing a trolley through the opening may take a number of forms. In one arrangement an alarm which may be visual, audible or both, is energised. A one-way barrier may also be included to prevent withdrawal of the trolley from the opening.

Various forms of direction-sensitive device can also be used. The cutting of one or more light beams by the wheel of the trolley is usable for this purpose; alternatively a magnetic element on the trolley may be sensed by the device as the trolley moves past. However, in the preferred arrangement a metal detector is used for the device.

The trolley identification unit is not normally needed when the detector is located at a position where it is continuously under the eye of staff operating the check-out cash registers. However, if the trolley-reception area is in an unsupervised area, for example adjacent a carpark used by shoppers, there is a greater opportunity for a person to experiment with the apparatus in the hope of triggering its coin or token dispenser unit by passing objects in front of the apparatus which are not trolleys. This risk is enhanced when the unit is designed to dispense coins rather than tokens (which have to be changed at the check outs) as may often be desired in shopping centres having a common carpark shared by customers of different retailing establishments.

The trolley-identification unit may be designed to respond to the physical dimensions of the trolley, to its magnetic or electrical characteristics, to its weight, or, to its influence on a static electrical or ultrasonic field,



which is a technique used in some intruder-detection devices.

In a first form of trolley-detection unit, magnetic detectors are arranged on opposite sides of a trolley corral/race. Only if a ferromagnetic object having the physical dimensions of a trolley is passed through the opening, will the unit respond.

In a second form of trolley-identification unit, the trolley is caused to run over a weighing platform set to respond to the weight of an empty trolley.

In a third form of trolley-identification unit the trolley is caused to run over four pressure-sensitive mats spaced from one another by the same distances as space the wheels of a trolley. Only if all four mats are operated at the same time does the unit operate to signal the positive identification of a trolley.

In a fourth form of trolley identification unit, magnetic detectors are located in the floor of the trolley corral/race. The output of these is sequenced with the output of the direction-sensitive device so that the trolley-identification unit only responds if the correct sequence is present.

In both the first and fourth forms of trolley-identification unit the detectors may be arranged in a staggered formation and at different levels on the same side or opposite sides of the trolley and/or on the floor beneath the trolley.

In a fifth form of trolley-identification unit the cage construction of the trolley is sensed by its influence on a static field which changes if a trolley passes the apparatus. The field may be an ultrasonic field, a magnetic



field or an electrical field such as is set up by microwave detectors. The nature of the field distortion produced by the presence of a trolley in front of the apparatus may be used to identify the trolley as a trolley. For instance, in the case of a magnetic field the effect of moving the metal cage of the trolley through the field can be to superimpose a cyclical variation on the field which can be sensed electrically, each cycle corresponding to the passage of one of the upright bars of the cage past the apparatus.

The invention is usable in premises where either high security or low security is required. If high security is required the shopper can be dispensed a ticket or token which is offset against a future bill incurred by the shopper when he next shops at the store. A high security system would be used when the trolley reception area is located remotely from a position where it is under supervision of the premises staff. There is then always a risk present that a conventional coin dispenser will be tampered with. In areas of low security, such as adjacent to the checkouts, this risk is much lower and legal tender coins can be dispensed.

The invention will now be described in more detail, by way of example, with reference to the accompanying drawings in which:-

FIGURE 1 is a diagrammatic plan view of a trolley corral/race extending from a position outside the check-outs of a supermarket to a trolley receiving area;

FIGURE 2 is an end view of the trolley corral/race viewed in the direction of the arrows A-A in Figure 1; and,

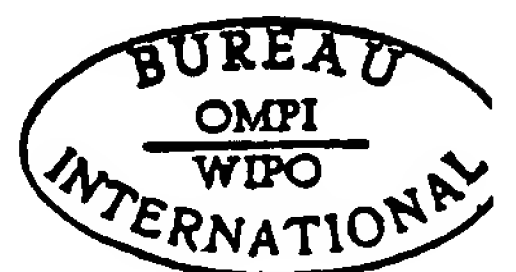




FIGURE 3 is a block circuit diagram of apparatus for detecting the movement of a trolley into the receiving area.

Figure 1 shows a corral/race 1 along which a trolley 2 is moved from a space 3 (for example, outside the check-outs) to a trolley-receiving area 4 (for example, in the retailing area of the supermarket). This corral/race 1 is located within a corridor having adjacent its floor side guides 30 which constrain the movement of the trolley to a predetermined path which is slightly wider than the width of the trolley 2 and is formed between a wall 6 of the supermarket and a post and chain fence 7.

At the entrance to the corridor the trolley 2 passes a box containing a metal detector assembly 8. This is located adjacent the basket of the trolley. As an alternative to a metal detector assembly an assembly which responds to a magnetic field may be used. The trolley 2 may also be provided with a magnetic element to give a strong magnetic signal to the detector as the trolley passes by.

The detector 8 contains two metal detecting members 10 and 11 spaced in the direction of movement of the trolley 2 when entering the corridor. Each of the members 10, 11 is connected to its own receiver 12, 13 and the outputs of the receivers are fed to the input terminals of a direction-sensitive device comprising a pair of sequencers 14, 15. The sequencer 14 responds to the following sequence of signals: First the reception of a signal from the receiver corresponding to operation of the member 10; secondly signals corresponding to both members 10 and 11 operating; and, thirdly a signal corresponding to the member 11 alone operating. This sequence corresponds to the trolley passing the detector 8 in the correct direction. Any other sequence is detected by the sequencer 15 which responds by energising an alarm circuit 16. This operates an audible alarm 18 and





illuminates a sign instructing the person trying to pull a trolley out of the corridor, to replace it.

Correct movement of the trolley 2 back through the corridor causes the sequencer 14 to provide a first output to reset the alarm circuit, if it has been tripped and a second output to a validation circuit 21. This generates an operating trigger pulse which is applied to a coin, token or ticket dispenser 22. A coin is then released into a tray 23 to the shopper and simultaneously a feedback signal is sent to the release circuit to provide a count of the number of coins released. When only a predetermined number of coins remains, a warning is given by the illumination of a sign stating the coin supply is low and replenishment is necessary. This signal may also be sent to a member of the supermarket staff responsible for coin replenishment. Thus the coin supply can be replenished before it is exhausted. The circuit 22 also energises a "thank you" sign in front of the customer to inform him that the coin, token or ticket is available for collection.

The arrangement described above may be modified in various ways. For example, an override push button may be provided to mute the alarm if it is not required in a particular situation. Also a mechanical non-return gate may be provided in the corridor to prevent a trolley from being withdrawn once it has passed the detector. Finally, in place of a metal detector a magnetic detector may be used for each of the detecting heads 10 and 11.



THE CLAIMS DEFINING THIS INVENTION ARE AS FOLLOWS:

1. Apparatus for responding to returned trolleys in a retailing establishment, comprising a detector positioned to monitor the movement of a trolley through an opening leading to a trolley reception area, a direction-sensitive device responsive to the direction of the trolley's movement through the opening, a dispenser controlled by the detector to dispense an item of monetary value to the shopper who correctly returns a trolley through the opening and means controlled by the direction-sensitive device to discourage the removal of a trolley from the trolley-reception area by way of the opening.
2. Apparatus as claimed in claim 1, including a trolley-identification unit which responds to an inherent characteristic of the trolley to provide an electrical output which exercises a supervisory control over the dispenser to prevent release of the item unless said inherent characteristic has been recognised by the unit.
3. Apparatus as claimed in claim 2, including guides to constrain movement of the trolley being returned through the opening to follow a predetermined path, and the inherent characteristic of the trolley sensed by the unit is a function of its length.
4. Apparatus as claimed in any one of the preceding claims, including two parallel rows of staggered trolley-detecting members.
5. Apparatus as claimed in any one of the preceding claims, in which the detector has two metal-detecting members spaced in the direction of movement of the trolley through the opening, and the direction-sensitive device responds to the sequence of detection of the trolley by the members to determine the trolley's direction of



movement and thus whether the dispenser is to release the item.

6. Apparatus as claimed in claim 5, in which the members are spaced in the direction of movement of the trolley by a distance less than the length of the trolley so that the correct sequence for release of the item from the dispenser comprises: detection of the trolley by the first member; simultaneous detection of the trolley by both members; followed by detection of the trolley by the second member alone.
7. Apparatus as claimed in any one of the preceding claims, mounted in a box having a flat face extending along one side of the path of movement of the trolley through the opening.
8. Apparatus as claimed in any one of the preceding claims, in which said means comprises a visual and audible alarm system.
9. Apparatus as claimed in claim 8, in which the alarm system ceases to operate in response to a signal from the direction-sensitive device, when a trolley being withdrawn the wrong way through the opening is returned in the correct direction through the opening to the trolley reception area.
10. Apparatus as claimed in claim 1, arranged and adapted to operate substantially as described with reference to the accompanying drawings.

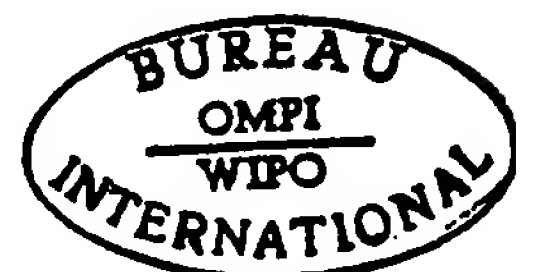


FIG. 1

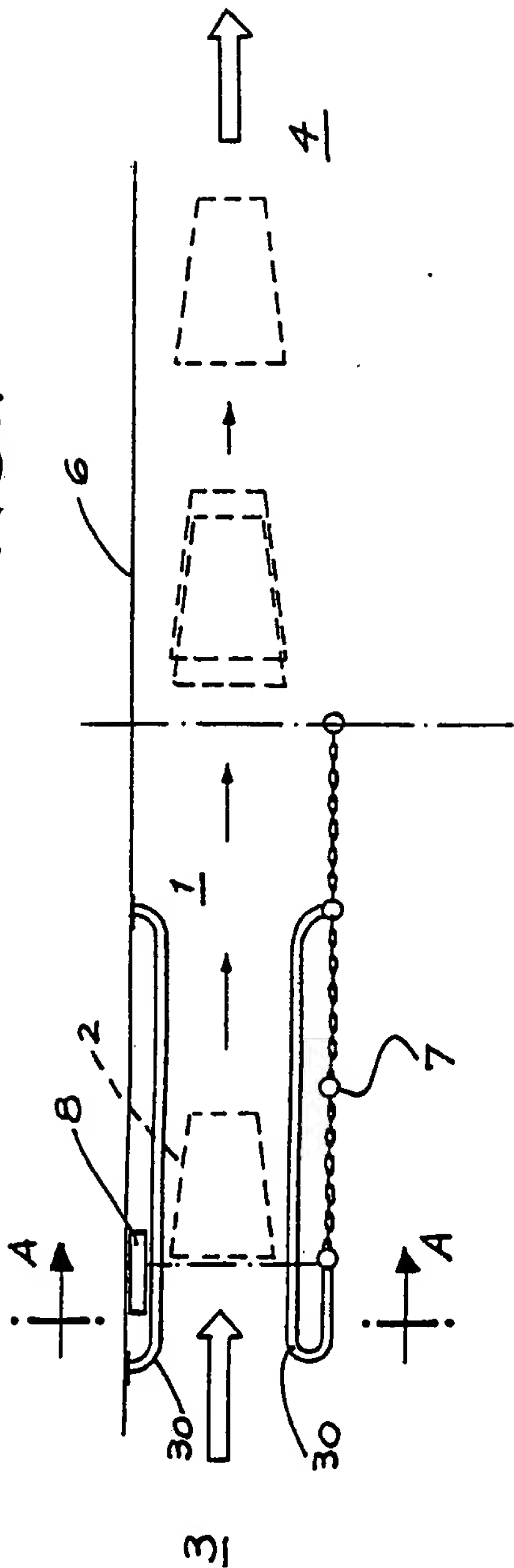
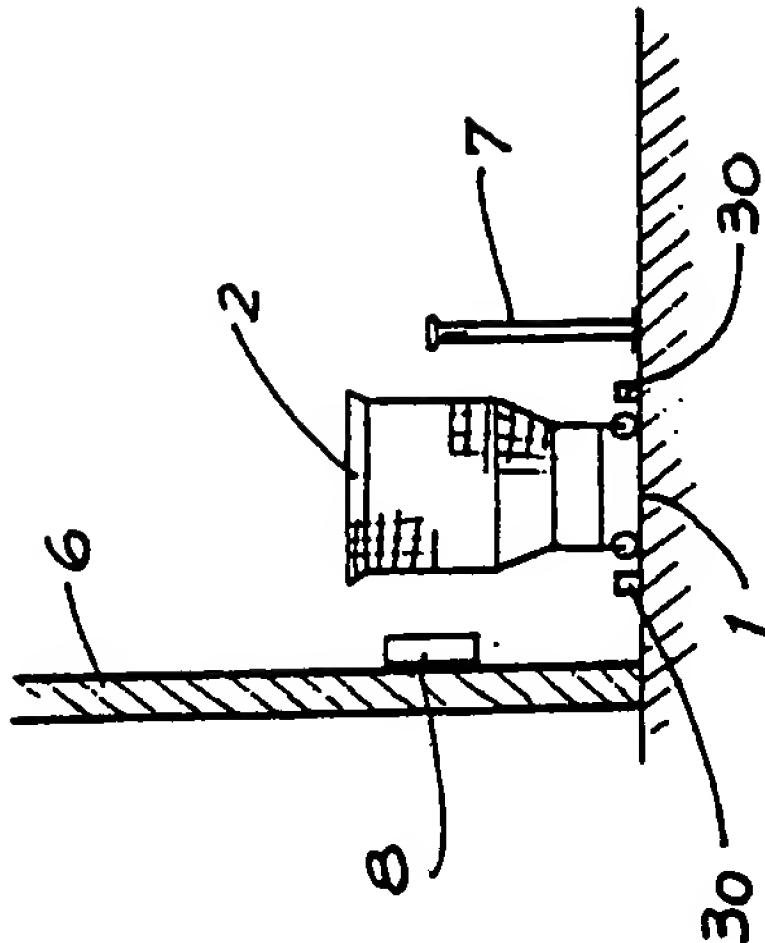
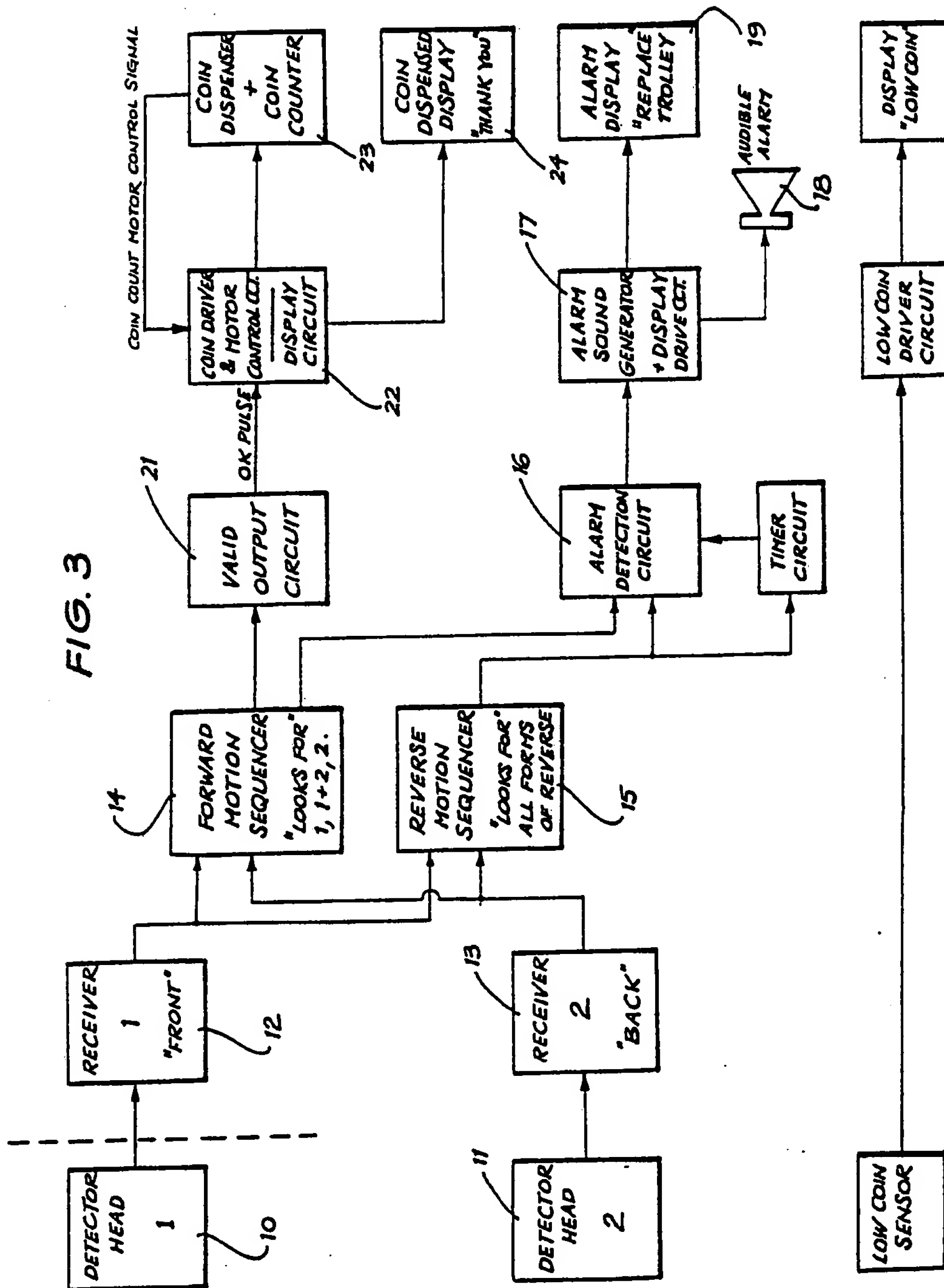


FIG. 2





# INTERNATIONAL SEARCH REPORT

International Application No. PCT/AU 84/00167

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) <sup>1</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl. <sup>3</sup> A47F 10/04, G07F 7/06, Int. Cl. <sup>2</sup> A47F 10/00

## II. FIELDS SEARCHED

Minimum Documentation Searched <sup>4</sup>

Classification System

Classification Symbols

IPC

A47F 10/00, 10/04, G07F 7/06

Documentation Searched other than Minimum Documentation  
to the extent that such documents are included in the fields searched <sup>4</sup>

AU: IPC as above. Australian Classification 55.70

## III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>14</sup>

Category <sup>15</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>
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X, Y, P	US, A, 4424893 (GILLET) 10 January 1984 (10.01.84)	(1-10)
X, Y	US, A, 3938638 (MOULE) 17 February 1976 (17.02.76)	(1-10)
A	US, A, 3457423 (GRAVELY) 22 July 1969 (22.07.69)	(8, 9)
X	US, A, 3283868 (KUHN ET AL) 8 November 1966 (08.11.66)	(1-10)
A	US, A, 3194377 (FISCHBACH ET AL) 13 July 1965 (13.07.65)	(1)
X, Y, P	GB, A, 2122792 (SUPERMARKET SYSTEMS (FRANCE)) 18 January 1984 (18.01.84)	(1-10)
X	GB, A, 2108745 (BYDALE ENGINEERING LIMITED (GB)) 18 May 1983 (18.05.83)	(1-10)
A	EP, A, 054090 (BYDALE ENGINEERING LIMITED) 23 June 1982 (23.06.82)	(1)
X	DE, A1, 3112655 (RUDOLPH WANZL AG) 14 October 1982 (14.10.82)	(1-10)

(continued)

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## IV. CERTIFICATION

Date of the Actual Completion of the International Search <sup>1</sup>

31 October 1984 (31.10.84)

Date of Mailing of this International Search Report <sup>2</sup>

14/11/84

International Searching Authority <sup>1</sup>

AUSTRALIAN PATENT OFFICE

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R. H. HETHERINGTON

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No <sup>18</sup>
X	DE, A1, 3130543 (RODOLPH WANZL AG) 17 February 1983 (17.02.83)	(1-10)
X	DE, A, 2249478 (MANSS) 2 May 1974 (02.05.74)	(1-10)



ANNEX TO THE INTERNATIONAL SEARCH REPORT ON  
INTERNATIONAL APPLICATION NO. PCT/AU 84/00167

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Patent Document  
Cited in Search  
Report

Patent Family Members

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US 4424893

CA 1169380  
ES 494969  
NO 802704

DK 882/81  
FI 811323  
FR 2465279

EP 25754  
FR 2485232

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US 3938638

AU 76004/74  
JP 50094995

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